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Interpreting the Speech of a Child with Autism Spectrum Disorder Using Discourse Analysis: A Qualitative Study of an ASD Idiolect

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Thank you to Sammy and Jenny for their generosity in sharing their speech with me. It was a gift.

ABSTRACT

In order to describe an autism spectrum disorder idiolect, this study employs a one-subject, in-depth analysis model to investigate how a 13-year-old child with autism communicates, using the analytical lens of discourse analysis. Using data from five 20-40 minute-long recordings of both natural and solicited speech, the research subject's use of language in unique or unexpected ways came to be understood as a systematic, consistent, and rich idiolect. These findings challenge pervasive prejudices about individuals with autism and indicate that the most interesting aspects of autistic speech are overlooked by neurotypical listeners. Implications for future research are discussed.

INTRODUCTION

Autism-spectrum disorder (ASD) is a developmental disorder diagnosed on the basis of abnormalities in social interaction, communication, and cognitive flexibility which present themselves before the age of three. ASD is known to influence linguistic development, including delays in linguistic onset and variability in linguistic skills. Individuals with ASD are often studied in linguistics due to their often atypical communicative style. A variety of different approaches have been used by researchers to study individuals with ASD. Some approaches are more diagnostic or behavioral (Gibson et al., 2013; Kuhl et al., 2005). Some approaches focus on the phonological aspects of the speech of individuals with autism (Shriberg et al., 2001; Schoen et al., 2011). This study examines the communication of a young teenager with autism using the approach of discourse analysis. Discourse analysis is defined here as extra-sentential analysis of language in use and in context and examines the communicative or pragmatic purpose of speakers' linguistic performance.

This study was inspired by Jessica De Villers' 2011 paper, "'I saw the yellowish going south': Narrative discourse in autism spectrum disorder," which analyzed the speech of William, a teenager with autism spectrum disorder, using discourse analysis. She found that while William appears at first to be inflexible communicator, further analysis revealed conversational participation, engagement, and coherence not previously evident (De Villiers, 2011). In this study, I used a similar one-subject, in-depth analysis model to investigate how a 13-year-old child with autism communicates, using the analytical lens of discourse analysis. The goal of this study was to investigate the subject's speech in order to understand how this individual uses language in unique, unexpected, or interesting ways, as well as to understand what communicative purpose(s) these phenomena serve. The data was composed of five twenty- to forty-minute recordings of both spontaneous and structured speech, principally composed of homeschooling sessions and informal familial conversations. From each recording, an approximately one-minute segment was transcribed and analyzed in depth. Other speakers are sometimes present (principally his mother Jenny), but Sammy is the speaker of focus.

METHOD

This study differs in method from many works studying children with ASD in two main ways. First, instead of investigating a group of individuals with ASD with the intent of making generalizations about ASD, this study endeavors to describe in depth the idiolect of one child with ASD. While it is certainly true that the gold standard for ASD researchers in generalizability,[1] there is value in describing in-depth the idiolect of an individual. The reason for this is twofold. First, by establishing the communicative patterns, systems, and purposes of an individual with ASD, we can discover how already established generalizations about ASD

[1] This is especially true in clinical studies which seek to establish generalities that will be helpful to speech-language pathologists working with ASD individuals.

present themselves on the individual level. If more researchers were to undertake analyses of the idolects of people with ASD, the collective body of work could serve as a pooled, patch-work corpus of idiolects. This would allow ASD researchers to generalize how pre-established generalizations present themselves in ASD idiolects. By describing in-depth a sufficiently large number of ASD idiolects, we could establish how and why certain generalizations appear (or do not appear). Furthermore, in educating the general public in ASD, it is useful to ground research in individual descriptions. A number of public figures in fields ranging from medicine to mathematics have advocated for presenting scientific research in more emotional, individual ways, with an emphasis on storytelling ("Doctor Mike"; Jackson, 2014). Arguably the most effective and famous communicator and advocator for autism awareness and education is Temple Grandin, who has rose to fame largely through the effective presentation of her own story ("About Temple Grandin"). ASD researchers must acknowledge the value of describing idiolects in order to not only broaden our knowledge of ASD and how it presents itself on the individual level, but also to produce a body of work that we can use to effectively communicate with the general public about ASD.

This study is also distinct because the subject of this proposed study has a personal and familial relationship with the researcher. Given the close relationship with the subject, an already established rapport of mutual respect and familiarity is in place with the researcher, which may minimize feelings of social or emotional discomfort as well as embarrassment, as the subject views the researcher as an "insider" in his family and as a familiar individual. However, in order to address potential ethical issues of assent, the subject was asked for written assent before the study began and was read a written statement (see Appendix 3) before recordings took place. In terms of privacy concerns about the recordings, steps such as the use of pseudonyms, only

including necessary personal information (such as age) in the study, only taking data in private settings, and closely protecting the confidentiality of the data were employed to address privacy concerns.

In order to avoid undue influence, a number of steps were taken. First, any language that could pressure the participant or make him feel obligated to participate were avoided. For example, any comments such as "Please help me by participating," or "I need to do this for school" were never used at any time to any participant. Furthermore, the consent form and the assent form specifically address the participants' right to drop out at any time. The written statement that was read at the beginning of each recording also includes a phrase which reminds participants of their right to drop out of the study at any time. Additionally, I paid close attention to the behavior and comments of participants to identify any signs of distress or hesitancy. I committed to immediately cease research if any signs of distress were present in order to ensure participants are comfortable with the situation, making sure to emphasize that they are free to cease participation at any point with no negative consequences. Given the familiarity and trust between myself and the subject, a positive rapport allowed me not only to minimize the observer's paradox, but also to better ensure the comfort of the subject. Since I was not an unfamiliar and unknown individual, I believe the subject was less apprehensive or embarrassed about my presence than he would be about a stranger.

INTRODUCTION TO ANALYSIS

Throughout the course of the study, a number of interesting linguistic phenomena have been present in the data, principally nonspeech vocalizations, breathy voice, non standard phone production, pitch and meter, and pronoun reversal. These phenomena represent some of the elements which make Sammy's idiolect unique and complex and therefore worthy of study. His

idiolect includes some elements which are consistent with previous research while also including elements which are not highly studied in the field of ASD research. Understanding and analyzing all of these elements of speech involves establishing their potential meaning or cause and (if present) their communicative purpose in context.

NONSPEECH VOCALIZATIONS

Vocalizations were present in all of the recordings and transcriptions. Nonspeech vocalizations are commonly associated with autism (Schoen et al., 2011) and are often encouraged by therapists at an early age as they may serve as a gateway to language development later in life (Hailpern et al., 2007). In Sammy, vocalizations are often present and serve multiple communicative purposes. The following transcription is an excerpt of the first recording transcription, which can be found in full in Appendix 2.

4 Sammy: {vocalizing} [uh,]
5 Jenny: [that's the ticket] (.) Sammy,
6 (1.4)
7 Sammy: {vocalization} (.9)
8 Jenny: that's the ticket, buddy.
9 (4.2)
10 Sammy: {vocalization}, (1) {vocalization}, (2.2) <breathy> {vocalization},
11 </breathy> (1.9) {vocalization},
12 (1) <quietly> sta </quietly>
13 (2.6)
14 Sammy: {vocalization} @@@@ (.7) {vocalization} @@@@[@]
15 Jenny: [What're] you thinking
16 about?
17 Sammy: <laughing/smiley tone> 'm thinking about the farm #,
18 </laughing/smiley tone>
19 Jenny: the what sound? (.)
20 Sammy: the farm <very quietly> stand. </very quietly>
21 Jenny: the *what* sound?
22 Sammy: !the farm stand,!=
23 Jenny: =oh the *farm* stand, o::h,=

In the first recording, which takes during a short transition period between two math activities, Sammy's use of vocalizations and his somewhat unusual vocal quality stand out as significant. Sammy often vocalizes, playing with pitch and breath on vowels (breathiness is noted in the transcription) and often using bilabial nasals ([m]), bilabial glides ([w]), and alveolar nasals ([n]). Although some vocalizations do not have a clear cause or meaning (they may serve as a comfort or pleasure to the speaker), some seem to be serving a communicative purpose. For example, in lines 10-11, Sammy vocalizes a great deal uninterrupted in this segment of the audio and in the following line (line 12) he says in a breathy tone of voice [sta:]. This is directly followed by a string of giggles and vocalizations that prompt Jenny to ask him what he is thinking about, to which he replies "I'm thinking about the farm stand." This vocalization ([sta:]) was therefore not a random choice. Sammy was preemptively, if only to himself, bringing up the topic of the farm stand, which clearly brought him a great deal of joy, based on the preceding laughter.

The second recording took place at my parents' home, as Sammy and his mom were visiting for the weekend. Jenny (his mom) is not in this recording, so this is a conversation between myself and Sammy while I pushed him on the swing in the front yard. Two excerpts are included, both containing examples of nonspeech vocalizations.

1 Eleni: that was pretty <h> high man, </h> (3.5) !did you have fun at great
2 wolf lodge?!
3 Sammy: <giggly> yes, </giggly> @@@@ [{vocalization}]
4 Eleni: [what did you do?]
5 (.6)
6 Sammy: <smiley> I was always playing on the blue tunnel slide.
7 </smiley> [@@@@@]
8 Eleni: [on the blue tunnel slide?]
9 (1.4)
10 Sammy: {laughing and vocalizations for 3.2 seconds}
11 Sammy: [@@@@@@@@@]
12 Eleni: [was it a tall slide?]
13 Sammy: @@@ yê::s, @@[@]
14 Eleni [yeah?]

15 (.8)
16 Sammy: {vocalization}
17 (.)
18 Eleni: were you scared?
19 Sammy: <breathy> yes::. </breathy>
20 Eleni: uh really scared or just a little?
21 Sammy: @@@@ <quickly> just a little </quickly>
22 Eleni: just a little.
23 Sammy: <quietly> @@@ </quietly>
24 Eleni: but it was mostly fun right?
25 Sammy: @@@ {vocalization for 1.5 seconds}

32 Sammy: I want to stop=
33 Eleni: [=ok.]
34 Sammy: [{vocalization for .6 seconds}]
35 (1.8)
36 Sammy: <breathy, quickly> let's do that again </breathy, quickly>

Much like the first recording, vocalization plays an important role in this data. In this recording, it seems that vocalization serves as a non-linguistic (but still verbal) expression of joy or excitement. Sammy enjoys high-adrenaline activities, like roller coasters and rafting, so the swing (especially going really high on the swing) is one of his favorite things to do at my parents' house. We can see examples of vocalizations in lines 3, 10, 16, 25, and 34. These instances are often preceded, followed, or coincide with laughing or giggling (so much so that distinguishing one from the other was sometimes difficult). This would indicate that vocalizations may serve the communicative purpose of expressing excitement or joy without actually articulating with specificity the emotions Sammy is experiencing.

The third recording took place at Sammy and Jenny's home during language arts homeschooling. The assignment that Jenny and Sammy were completing involved learning a series of adjectives (in this case "squeaky") and writing sentences that included the adjective. In the recording, Sammy and Jenny refer to someone named Mr. Brown, who is an elderly neighbor

that they sometimes visit and chat with. This recording takes place in a relatively structured environment (homeschooling).

11 Jenny: sound. [write it down]
12 Sammy: [{vocalizations for .9 seconds}] @@@@ {vocalizations for 2.4
13 seconds}
14 Sammy: @@@@@@@@ ![@@@@@@@@@@]!
15 Jenny: [what kind of noise is Mr. Brown making?]
16 (.)
17 Sammy: a squeaky,
18 (.)
19 Jenny: yes,=
20 Sammy: =sound [{vocalizations for 1 second}]
21 Jenny: [good,] write it down.
22 (.6)

53 Sammy: makes a squea[ky]
54 Jenny: [ok.] (.) put makes in here. put the word [makes in here] (.)
55 Sammy: [{vocalizations}]
56 Jenny: [Mr. Brown makes]
57 Sammy: [{vocalizations}]

Much like the two previous recordings, vocalization plays an important role in this data. In this recording, vocalization serves as an non-semantic (but still verbal) expression of excitement or reflection. Much like recording 1, Sammy tends to vocalize when something is amusing or exciting to him, as seen in lines 8-9. Sammy's vocalizations overlap with Jenny's utterance, in which she prompts him to use the adjective "squeaky" to describe the sound Mr. Brown makes. In the line following the vocalization (line 9), Sammy speaks in a smiley, happy tone of voice, which indicates that is amused or excited by the topic at hand. The coincidence of vocalizations with these emotions is consistent with previous data. A similar instance occurs in lines 12-14, in which vocalizations directly precede an extended period of laughter/giggling. In this recording, however, Sammy also seems to vocalize when he is engaged in thought or mental labor, as in lines 55-57, in which he works to correct the grammar of his sentences. His

vocalizations overlap with Jenny's utterances prompting him to make corrections. I argue that vocalizations may be comforting or useful to Sammy in working through tasks that require thoughtful engagement or reflection.

The fourth recording took place in Sammy and Jenny's home, during a homeschooling session. The three excerpts which included vocalization are presented below.

12 Jenny: yes, (1.8) <quiet> here </quiet> scoot over here.
13 Sammy: {vocalizations for 1.8 seconds}

24 Eleni: is he older than you or younger than you?
25 (1.9)
26 Sammy: y::ounger. (1.5) {vocalizations for .5 seconds}
27 Jenny: hmm. (.7) you know {what? (.) if you don't know you can say} I don't know,
28 Sammy: <quiet> {vocalizations for ~1.6 seconds} </quiet>

37 Jenny: n# he was born in january you were born in june, (1.1) so who's older?
38 (1.4)
39 Sammy: Elen <breathy> i, </breathy> (.4)
40 Eleni: ##{##}
41 Jenny: {yes that's true} you are older {than all of them ##}
42 Sammy: !{vocalizations for 1.6 seconds}!
43 (.5)
44 Jenny: Brody's a little bit older than you.

Vocalizations play an important role in this data as well. For example, in line 13, we can hear Sammy vocalize using the phones /d/, /o/[2], and /m/. This particular vocalization also seems to include vocal fry on the vowel. In line 26, Sammy vocalizes using /m/ and potentially /w/. In line 35, we also hear /m/ and in line 42 (while it is difficult to hear clearly because of overlap), it appears Sammy uses the phones /w/, /a/, and /n/ in his vocalizations. This information, combined with previous vocalizations seen in other parts of the data, seem to indicate that Sammy's most used phone is /m/. This phone is found in 96% of human languages, according to the database

[2] This could also potentially be /ɔ/. His articulation was not clear.

PHOIBLE, and is therefore the most common phone ("Segments"). The bilabial nasal is not only common; it is also relatively easy to articulate compared to other English phones which can be extremely difficult including for example /ɹ/ and /θ/ (Jakobson, 21-22). It is therefore not particularly surprising that Sammy would choose this particular phone so often, given the fact that vocalization may serve be comforting and/or pleasurable to him, as established in previous analyses. Furthermore, the presence of vocal fry in line 13 seems to indicate an interest in playing with voice quality, which is further reinforced by further data (discussed below) in which Sammy varies with volume and breathiness in speech and vocalizations

While vocalizations appear throughout the data in different contexts, they seem to all be serving both an internal and communicative purpose. Given the emotional and cognitive labor involved in articulating specifically what is challenging, engaging, or exciting about a given task, Sammy seems to opt for an atypical but still effective method of communicating his feelings to others: nonspeech vocalizations Given the conversation cost in terms of time and effort involved in consistently and specifically identifying one's thoughts and feelings, Sammy's vocalizations are an efficient method of communication. While they may not be speech, they are certainly linguistic and serve a communicative purpose, especially when his interlocutor is familiar with his communicative style (as is the case in these recordings).

BREATHY VOICE AND TONE OF VOICE

Breathy voice is a "phonation in which the vocal cords vibrate, as they do in normal (modal) voicing, but are held further apart, so that a larger volume of air escapes between them" (Chávez-Peón, 2011). In layman terms, we can think of breathy voice as a combination between normal phonation and whispered speech. In Sammy's speech, we see numerous examples of breathy voice quality. Furthermore, we see numerous examples of tone of

voice serving as an extra-speech linguistic element that enrichens Sammy's idiolect. In regards to breathy voice and tone of voice, their meaning is comparable to vocalization in that it reflects thoughts, feelings, or emotions that are not directly articulated but are present in his speech.

In recording 2, instances of breathy voice and tone of voice are present and support the above-mentioned interpretation:

6 Sammy: <smiley> I was always playing on the blue tunnel slide.
7 </smiley> [@@@@@]

18 Eleni: were you scared?
19 Sammy: <breathy> yes::. </breathy>

26 Eleni: like the verbolten?[3]
27 Sammy: <smiley> yes. </smiley> (.7) my favorite is the black, (.4)
28 forest.

36 Sammy: <breathy, quickly> let's do that again </breathy, quickly>

Tone of voice plays an important role in this recording. A smiley or laughing tone can be seen in lines 6 and 27, where he is speaking about experiences that brought him joy or excitement, thus explaining the tone. Another interesting linguistic phenomenon was the breathiness seen in certain sections of the data (lines 19 and 36 in this recording). While I was unable to present a hypothesis previously (given the limited data), I would now argue that breathiness seems to coincide with nervousness or excitement. The first example in this data (line 19) is an example of a kind of nervous excitement, in which Sammy admits to feeling scared of the "blue tunnel slide." In line 36, we see an example of excitement, in which Sammy requests that we go for another round on the swing. Taken together, we see how Sammy's breathy and smiley tone of voice contribute to his ability to communicate his emotions.

In recording 3, breathiness occurs very often in the data, as seen in lines 25, 27, 36, 39, 43, and 50.

[3] Roller coaster that Sammy enjoys going on.

Sammy: <softly/breathy> m, </softly/breathy> that spells mister.
Jenny: yes.
Sammy: <softly/breathy> b r, (.3) o (.) w n, </softly/breathy> spells brown,=
Jenny: = mhm, (.6) keep going,
(.6)
Sammy: i spells is,[4]
Jenny: uh huh,
(1.2)
Sammy: a huge:[5] sound
(.3)
Jenny: uh a? (.3) <H> eee eee, </H>
Sammy: a squeaky.
Jenny: good, (.)
Sammy: <softly/breathy> a spells a </softly/breathy>
Jenny: uh huh
(.4)
Sammy: <softly/breathy> s q:::[6], (1.8) u:: e: a:, (.9) that spells uh squeaky
</softly/breathy> (.3) #=
Jenny: =yes,
(.4)
Sammy: <softly/breathy> s o, (.8) u n d, </softly/breathy> spells sound.=
Jenny: =good read the beautiful sentence you made. (.7) read it. (1)
Sammy: Mr Brown [is a squeaky sound,]
[taps pencil on table]
Jenny: i:s what? (.) we forgot a word. (.) i:s?
Sammy: {vocalizations for .5 seconds}
Jenny: Mr. Brown is, add the word. (.) Mr. Brown i:s? (1.1)
Sammy: <softly/breathy> a squeaky sound </softly/breathy> (1.1)

Instances of breathiness also coincide with lowered volume, which is logical, given the fact that breathy voice is a sort of combination of normal phonation and whisper. In this data, breathiness occurs almost exclusively when Sammy is spelling. I previously argued that breathiness coincided with nervousness or excitement. While this data does not refute this assertion, it does add a layer of nuance. While it is possible Sammy is nervous or excited while completing his spelling exercises, I don't think it is likely. Rather, I think the breathy vocal

[4] Unsure if this is correct transcription. Will double check with his mother.
[5] /ˈhjuʤə/
[6] /kj::::u:/

quality is related to his interest in meter and rhythm (discussed further in the section "Pitch and Meter"). Much like Sammy enjoys experimenting with these prosodic elements, Sammy may enjoy experimenting with vocal quality, especially when engaged in a task that is engaging him mentally (such as spelling). In this way, the explanation for breathy voice is a combination of the explanation for vocalizations and the explanation for shifts in meter.

PHONE PRODUCTION

While researchers have established that articulation and phonology are relatively strong areas of development in ASD individuals, there is evidence of non-standard phone production in ASD children. Certain error types were more common than others, with the most common type of error being gliding, followed by cluster reduction, and final consonant deletion (Cleland et al., 2010). Shriberg et al. also undertook a study identifying the most common phones which were commonly articulated atypically by ASD subjects. They found high instances of dentalized or lateralized productions of sibilant consonants (/s/, /z/, /ʃ/, /ʒ/, /tʃ/, /dʒ/) and distortions of liquid and rhotic consonants (derhotacized productions of /r/, /ɝ/, or /ɚ/ and labialized productions of /l/). The researchers hypothesized that this high-prevalence of speech-sound distortions is ASD individuals may reflect the speaker's failure to attend to fine-tuning speech production to match model of ambient linguistic community (Shriberg et al., 2001). In Sammy's case, we see some examples which reflect these findings (distortions of liquid consonants), but also see evidence of other non-standard phone productions which are not widely mentioned in the literature (e.g. phone elongation.)

In recording 1, we see two clear examples of phone elongation.

27 Sammy: then h^{h}is::try,
28 Jenny: yes.
29 Sammy: then teach: to[w:n],

This can be seen in lines 27 and 29, where he elongates the phones [s] (line 27), [tʃ] (line 29), and [aʊ] (line 29). The elongation of [tʃ] could also be interpreted as a strong aspiration or even ejective. Regardless, the pronunciation is non-standard. These non-standard productions reflect a richness of his idiolect, but also demonstrate an affinity for experimentation in speech which is seen throughout the data. In recording 2, we see two further examples of elongation of phones (lines 13, 19, and 40).

13 Sammy: @@@ yê::s, @@[@]
19 Sammy: <breathy> yes::. </breathy>
40 Sammy: we-:::: @@@ (1.7) @@@@ (1) <excited> let's go really high again,

In recording 3, we also see examples of phone elongation. For example, in line 39, Sammy elongates the phone [j] when saying the letter "q" in order to spell the word "squeaky." Elongation also occurs to a less extreme degree on the vowels /u/, /i/, and the diphthong /aɪ/. I have explained this elongation with Sammy's interest in rhythm and sound, but the coincidence with a spelling task suggests that phone elongation may be connected to cognitive labor.

39 Sammy: <softly/breathy> /ɛs kj:::u, (1.8) ju:: i: waɪ:/, (.9) that spells uh squeaky

A highly interesting example involving Sammy's unusual articulation of phones can be seen in line 4 of recording 4, in Sammy's pronunciation of the world "play."

1 Sammy: I like the play group, (1.2)
2 Jenny: w#, (.4) what'd you mean you like it? (4.1) be specific, (.6) be specific,
3 psihoula[7]
4 Sammy: I like to go the *pla:*y group,

He seems to be producing a strongly aspirated /p^{h}/ followed by a non-velarized lateral approximant /l/. In General American English, /l/ is velarized in all positions (dark "l") (*Accents of English:Volume 2*, 490). Therefore, instead of producing the standard pronunciation of 'play' which has a dark "l," Sammy produces a light "l". However, this is not a mispronunciation, as

[7] Greek term of endearment, literally meaning "little soul."

Sammy produces the correct pronunciation only seconds earlier in line 1. The strong aspiration is especially interesting given the further example of such aspiration in line 27 of recording 1 (see above). This therefore seems to be another example of Sammy playing with sound and speech, as seen in the examples of phone elongation above. However, there is further meaning in these productions. As proven by the findings of Shriberg et al. and Sammy's own speech, Sammy's non-standard phone production does not reflect a cognitive deficit, but must have an alternative explanation. I argue that this explanation is twofold. It reflects firstly his inclination to experiment with speech and sound. On a deeper level, it reflects Sammy's tendency to not expend unnecessary cognitive labor in assimilating strictly to the linguistic habits of the surrounding linguistic community.

PITCH AND METER

In the section "Phone production," I explained that phone elongation seems to be tied to Sammy's interest in rhythm and sound. This still holds true in this case, but I think it can be applied further, as seen in the example below from recording 3.

30 (1.2)
31 Sammy: a huge:[8] sound
32 (.3)
33 Jenny: uh a? (.3) <H> eee eee, </H>

In line 31, when Sammy says the word "huge," which is realized as /ˈhjuʤə/, with a schwa inserted at the end of the word. The insertion of the schwa shifts the utterance ("a huge sound") from a trisyllabic bacchius to a tetrasyllabic iamb (or diiamb). The iamb is the most common meter of poetry, and all of Shakespeare's poems and poetry are iambic. Compare /ə hjuʤ saʊnd/ to /ə ˈhjuʤə saʊnd/. The insertion of the schwa completely changes the meter of the

[8] /ˈhjuʤə/

utterance. I would certainly not argue that Sammy is consciously choosing to use a diiamb due to his commitment to poetic meter in English poetry. However, he does have an interest in playing with rhythm and meter with his speech. This particular example seems to reflect an intuitive, internalized understanding of English prosody.

Another interesting example of non-standard meter occurs earlier in the recording in line 6.

3 Sammy: Mr. Bro[wn,]
4 Jenny: [@@] That's right, (1) sentence. (.) tell me about Mr. Brown.=
5 Sammy: = {vocalizations for 1.3 seconds} @@ (0.5) Mr. Brown is @@@ is @@ (.3)
6 making a sharp high-pitched /ə/ sound adj*ec*tive,=

In line 6, Sammy pronounces the word adjective (Standard American English pronunciation: /ˈæʤɪktɪv/) as /æˈʤɛktɪv/. This shifts the word from a dactyl[9] to an amphibrach.[10] This is not an unintentional mispronunciation on Sammy's part. At 0:25 in the recording, he pronounces adjective using the standard pronunciation. However, throughout the rest of the recording, whether it be alone or in conjunction with other words, he pronounces adjective in his own way. This may be because Sammy is reading the word off of a worksheet (whereas the first pronunciation at 0:25 was produced without reading). In fact, at 8:15 in the recording, Sammy seems to have a false start in which he pronounces adjective using the standard pronunciation and then "corrects" himself to his unique pronunciation. Dactylic meter is quite rare in English poetry and is certainly not nearly as common as iambic meter. However, amphibrachs are also very rare in English poetry. In two instances, Sammy's pronunciation of adjective results in the creation of iambs. For example, at 22:05 in the recording, Sammy reads "un*pleas*ant *sounds*

[9] A foot composed of an accented syllable followed by two unaccented syllables (as in the word poetry). While common in the epic poetry written in Ancient Greek and Latin, it is not a common meter for English poetry. The most famous English-language poem which uses dactylic hexameter is the epic poem *Evangeline: A Tale of Acadie* by Henry Wadsworth Longfellow (see https://www.hwlongfellow.org/works_evangeline.shtml).
[10] A foot composed of a long or accented syllable preceded and followed by short or unaccented syllables.

ad*jec*tive." In this case, his pronunciation of adjective has rendered the meter more poetic. The same can be said for line 6 of the transcription, in which an inserted schwa along with Sammy's shifted pronunciation result in the creation of three consecutive iambs. However, this does not explain all instances of this pronunciation (e.g. at 4:42, Sammy says "*calm* or *peace*ful ad*je*ctive," which results in two consecutive unstressed or short syllables). Therefore, Sammy is not shifting his pronunciation in order to shift the meter of the entire utterance or sentence. He is shifting his pronunciation of the word adjective because of something about the word itself. English does not have predictable lexical stress, as seen in languages like French and Italian, so there is no inherent reason for Sammy to systematically prefer stress on the first, second, or third syllable.

Experimentation with stress is not limited to Sammy and his idiolect. For example, Grossman, Bemis, Skwerer, and Tager-Flusberg (2010) investigated perception and production of lexical stress and the processing of affective prosody in adolescents with high-functioning autism. They found that atypical prosody contributes to perception of reduced social and communicative competence in individuals with ASD and is one of the earliest and most salient features of abnormal communication noted by non-ASD listeners. They also established that the distinction between ASD individuals and non-ASD individuals is tied to unique speech patterns, not a lack of competence in lexical prosody. The high-functioning autism group in the study did not show deficits or immaturity, but rather an overall atypical pattern on two-syllable word productions (Grossman et al., 2010). These results would indicate that Sammy's atypical prosodic production is not a deficit in communicative or linguistic competence, but rather another element of his idiolect.

In recording 4 we see Sammy experiment with pitch on individual vowels rather than the meter of a full utterance.

8 Sammy: ‘cuz I wanna go see our frie: nds.
9 Jenny: that’s good, (.) who d’you wanna see?
10 Sammy: Br::ó:::dy

In line 10, we see an example of Sammy playing with pitch on the vowel /o/, beginning with mid pitch and rising to high pitch. This particular example also occurs in conjunction with phone elongation, so the pitch variation is highly noticeable. As to why Sammy chooses to vary his pitch on this particular word (“Brody”), it is not entirely clear, although it may be related to his interest in the sounds themselves, as he elongates the phones /ɹ/ and /o/.

Sammy’s interest in pitch is not particularly surprising when one considers the already studied and established connection between autism and pitch. Heaton et al. established that children with ASD were exceptionally sensitive to changes in pitch contours across different types of auditory stimuli (Heaton et al., 2008). In fact, children with ASD had higher percent correct scores in the identification of the pitch experimental stimuli than the control (non ASD) group. Therefore, we can interpret Sammy’s repeated experimentation with pitch in speech as potential evidence that superior pitch discrimination manifests itself as increased non-standard pitch production.

PRONOUN REVERSAL

Pronoun reversal is highly common and well-documented in children with autism. Leo Kanner described this phenomena all the way back in 1943, in which he provided an account of a young boy who tripped and nearly fell and then said “You did not fall down” (Kanner, 1943). In this instance, the child used a second-person pronoun when the standard use would be to use a

first-person pronoun. We see first-person and second-person pronoun reversal in the data, as seen below in recording 1.

43 Sammy: =I wanna use both hands, @@
44 Eleni: this is both hands,
45 (.7) {car with loud engine drives by}
46 Sammy: @@[@]
47 Eleni: [make sure] you use the right !pronoun!.
48 (.6)
49 Sammy: Eleni would you <h> use my both hands? </h>
50 Eleni: yes, I would use both hands.

Sammy shows pronoun reversal in line 43 when he says "I wanna use both hands," intending to communicate that he wanted *me* to push him on the swing with both of my hands (i.e. "I want you to use both of your wands"). After prompting, he corrected himself, but still included an instance of pronoun reversal (line 49): "Eleni, would you use my both hands?" The standard production would be something along the lines of "Eleni, would you use both of your hands?" There is a great deal of research regarding why pronoun reversal is so common in children with autism, but one study in particular offers an interesting explanation. Shield, Meier, and Tager-Flusbery studied how children with autism exposed to American Sign Language from birth used pronouns. They found that "evidence from an elicitation task and parental report that signing children with ASD avoid sign pronouns in favor of names" (Shield et al.). That is, despite the fact that sign pronouns are "indexical points," children with autism still show a preference to names over pronouns. The researchers argue that this stems from a confusion in the children's sense of self; that is, a fuzziness in the boundary between oneself and others. I would argue that this explanation, with a caveat, may clarify Sammy's pronoun reversal. While I agree that a more third-person worldview may be Sammy's way of viewing the world and would line up with the data, it is also true that Sammy was able to partially correct himself after prompting. I have also noticed in previous interactions that he can flawlessly correct himself after prompting

and often produces phrases with pronouns but no pronoun-reversals. Therefore, given the fact that most children with ASD who do show pronoun reversal outgrow it by their teens, it seems Sammy is in a transition period between more consistent pronoun reversal and no pronoun reversal.

Another example of pronoun reversal is seen in recording 5 and occurs at several points throughout the recording in lines 1, 3, and 7.

1 Sammy: <mumbled> 'm gonna do I wanna push me ten times, </mumbled>
2 Jenny: say it correctly, (.)
3 Sammy: I want to push me.
4 (1.3)
5 Jenny: in a question,=
6 Sammy: ={vocalizations for 1.4 seconds}
7 Sammy: John will push you ten times,=
8 Jenny =well you gotta ask him.
9 (1.6)
10 Sammy: John would you push me !*ten*!?
11 John: yes::.
12 Jenny: and a- [uh what's]
13 Sammy: <h> [vocalizations for .8 seconds] </h>
14 Jenny: the polite way to say that? John, (0.4) would?=
15 Sammy: =would you (.) <quickly> go outside and push me ten times? </quickly>
16 Jenny: *please*?
17 Sammy: please?
18 John: yes:::, I would ## that sir Sammy.

This instance of pronoun reversal is particularly interesting, because we see evidence of self-correction upon prompting. In this case, the pronoun reversal begins as a usage of first person pronouns where second person would be standard ("I wanna push *me*"). However, in line 7, we see pronoun reversal in which second person pronouns are used where first person would have been standard ("John will push *you*"). The fact that we see a confusion of first person with second person and vice verse demonstrates that Sammy's pronoun reversal is not a result of a preference for one or the other. That is, Sammy does not privilege a first-person point of view (as

most neurotypicals do) and also does not privilege a second-person point of view (which would be highly unusual and unexpected given no previous research suggesting this is the case). Rather, it seems Sammy privileges a third-person point of view, resulting in the confusion of pronouns. Given the prompting and correction process that Sammy goes through in this excerpt, it seems that it takes cognitive labor on his part to choose the correct pronoun, whereas most neurotypicals have little difficulty naturally choosing the correct pronoun. However, his ability to self-correct demonstrates an underlying abstract understanding of pronouns. That is, the seeming deficit in linguistic production is not proof of an underlying cognitive deficit. Rather, it is another element of Sammy's rich idiolect.

CONCLUSION

Especially when it comes to describing autistic spectrum disorder in linguistic terms, it is worthwhile to describe idiolects. Sammy's idiolect is rich, complex, and pertinent to ASD research as a whole. Through this study, we can establish how clinical and behavioral studies do or do not apply at the individual level. Sammy's pronoun reversal was quite textbook when previous research is considered. However, his phone production was more nuanced than previous research may suggest. There is not a great deal of work being done on phone elongation in autistic people, but this is an essential aspect of Sammy's idiolect. Meter and pitch in ASD are understudied phenomena in linguistics, but are absolutely typical of Sammy's speech. Furthermore, this description and analysis is easier to explain and understand from the point of view of the general public. It provides an opportunity to describe generalizations in an individual sense. More research of idiolects must be undertaken if we are to a) improve our understanding of ASD and language and b) express these findings to non-linguistics in a way that is effective and potent.

In both academic and non-academic applications, it is important to have communicative empathy. Neurotypical individuals must make an effort to understand both the science of ASD speech and an individual's idiolect. Such an effort will contribute to a collective project of being able to better understand autistic people and improve cross-community empathy and knowledge. I am reminded of a quote from De Villiers which encapsulates this thought: "While William's conversation would be hard to follow if one were a naive listener, linguistic analysis allows one to discover a narrative underlying the discourse that is hidden and obscure… By identifying and describing such observable patterns of language use, the close reading of the text demonstrates how discourse analysis can contribute to clinical language research." We must learn and improve our knowledge constantly in order to avoid being a "naive listener."

In my opinion, this is the importance of this kind of research; undertaking a study of an idiolect is an exercise in understanding, analysis, and empathy. Qualitative research is undervalued and is therefore not undertaken nearly enough. O'Reilly et al. argue that qualitative research (including conversational analysis and discourse analysis) can refine our understandings of particular issues to ASD and can be practically relevant. They write: "Qualitative methods are able to go beyond establishing the likelihood of associations between variables, towards understanding the nature of such associations and the complex processes that they may be interpreted to represent" (O'Reilly, 2015). All researchers of ASD must begin to accept and incorporate this philosophy into their analytical and experimentative practice if the field is to substantially move forward. Sammy is just one example of the power of studying idiolects and I hope to see many more such investigations as this domain of study moves forward.

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Appendix 1: Transcription Style

Line numbers	1 2
Speaker labels	Sammy:
Utterances	That was funny
Question intonation	?
Falling intonation	.
Continuing intonation	,
Emphasis	That *was* funny
Pause	(5.2)
Pause shorter that 0.2 seconds	(.)
Overlap	See what you think [about this.] [Well,]
Lengthening	:
False start	I was- I was
Latching	I was coming home.= =You were coming home
Pitch or voice quality	<h> Oh my God! </h>
Loud volume	!I was walking home!
Laughter	@ (per each pulse)
Vocalizations (with duration)	{vocalizations for 1.0 seconds}
Unintelligible utterances	# (for each syllable)

Appendix 2: Recordings

RECORDING 1

Sammy: <quietly> twenty six, (.) plus twelve, </quietly>
Jenny: ding ding ding::::, (.6) that's the ticket
(1)
Sammy: {vocalizing} [uh,]
Jenny: [that's the ticket] (.) Sammy,
(1.4)
Sammy: {vocalization} (.9)
Jenny: that's the ticket buddy.
(4.2)
Sammy: {vocalization}, (1) {vocalization}, (2.2) <breathy> {vocalization},
</breathy> (1.9) {vocalization},
(1) <quietly> sta </quietly>
(2.6)
Sammy: {vocalization} @@@@ (.7) {vocalization} @@@@[@]
Jenny: [What're] you thinking
about?
Sammy: <laughing/smiley tone> 'm thinking about the farm #,
</laughing/smiley tone>
Jenny: the what sound? (.)
Sammy: the farm <very quietly> stand. </very quietly>
Jenny: the *what* sound?
Sammy: !the farm stand,!=
Jenny: =oh the *farm* stand, o::h,=
Sammy: <breathy> =mom? </breathy>
Jenny: okay. (.) what do we have here? this is the last one then we're gonna do
our khan academy.
Sammy: then $h^{h}$is::try,
Jenny: yes.
Sammy: then teach: to[w:n],
Jenny: [ye-,.]=
Sammy: =then done.=
Jenny: =yes,
Eleni: <softly> @@@ </softly>
Jenny: okay go,
Sammy: ## then Louie
Jenny: yes,=
Sammy: = then go. (.)
Jenny: !yes.!
(1.6)
Jenny: okay [you can write this one up here,]
Sammy: [{humming/vocalizing}]

(.3)
Sammy: {vocalization},

RECORDING 2

Eleni: that was pretty <h> high man, </h> (3.5) !did you have fun at great wolf lodge?!
Sammy: <giggly> yes, </giggly> @@@@ [{vocalization}]
Eleni: [what did you do?]
(.6)
Sammy: <smiley> I was always playing on the blue tunnel slide. </smiley> [@@@@@]
Eleni: [on the blue tunnel slide?]
(1.4)
Sammy: {laughing and vocalizations for 3.2 seconds}
Sammy: [@@@@@@@@@@]
Eleni: [was it a tall slide?]
Sammy: @@@ yê::s, @@[@]
Eleni [yeah?]
(.8)
Sammy: {vocalization}
(.)
Eleni: were you scared?
Sammy: <breathy> yes::. </breathy>
Eleni: uh really scared or just a little?
Sammy: @@@@ <quickly> just a little </quickly>
Eleni: just a little.
Sammy: <quietly> @@@ </quietly>
Eleni: but it was mostly fun right?
Sammy: @@@ {vocalization for 1.5 seconds}
Eleni: like the verbolten?[11]
Sammy: <smiley> yes. </smiley> (.7) my favorite is the black, (.4) forest.
(.7)
Eleni: your favorite is the black forest?
(.6)
Sammy: I want to stop=
Eleni: [=ok.]
Sammy: [{vocalization for .6 seconds}]
(1.8)
Sammy: <breathy, quickly> let's do that again </breathy, quickly>
Eleni: <quietly> ok. </quietly> your favorite is the black [forest]?
Sammy: [##] (.) go really high,
Eleni: ok let's go really high, (2.1) what did you just do with your toe man?
Sammy: we-:::: @@@ (1.7) @@@@ (1) <excited> let's go really high again, </excited>
Eleni: ok, (.3) let's go.=

[11] Roller coaster that Sammy enjoys going on.

43 Sammy: =I wanna use both hands, @@
44 Eleni: this is both hands,
45 (.7) {car with loud engine drives by}
46 Sammy: @@[@]
47 Eleni: [make sure] you use the right !pronoun!.
48 (.6)
49 Sammy: Eleni would you <h> use my both hands? </h>
50 Eleni: yes, I would use both hands.
51 Sammy: @@
53 (1.7)
53 Eleni: good job.

RECORDING 3

1 Jenny: what kind of sound is this? (.4) <h> !eee eee! </h>
2 (.8)
3 Sammy: Mr. Bro[wn,]
4 Jenny: [@@] That's right, (1) sentence. (.) tell me about Mr. Brown.=
5 Sammy: = {vocalizations for 1.3 seconds} @@ (0.5) Mr. Brown is @@@ is @@ (.3)
6 making a sharp high-pitched /ə/ sound adj*ect*ive,=
7 Jenny: =yes he's making a harsh- sharp high-pitched sound (0.8) [he's making] a?
8 Sammy: [{vocalizations}]
9 Sammy: <smiley> squeaky, </smiley>
10 (0.5)
11 Jenny: sound. [write it down]
12 Sammy: [{vocalizations for .9 seconds}] @@@@ {vocalizations for 2.4
13 seconds}
14 Sammy: @@@@@@@@ ![@@@@@@@@@@]!
15 Jenny: [what kind of noise is Mr. Brown making?]
16 (.)
17 Sammy: a squeaky,
18 (.)
19 Jenny: yes,=
20 Sammy: =sound [{vocalizations for 1 second}]
21 Jenny: [good,] write it down.
22 (.6)
23 Sammy: #[#]
24 Jenny: [oh] whole sentence, Mr? (0.4)
25 Sammy: <softly/breathy> m, </softly/breathy> that spells mister.
26 Jenny: yes.
27 Sammy: <softly/breathy> b r, (.3) o (.) w n, </softly/breathy> spells brown,=
28 Jenny: = mhm, (.6) keep going,
29 (.6)
28 Sammy: i spells is,
29 Jenny: uh huh,
30 (1.2)

Sammy: a huge:[12] sound
(.3)
Jenny: uh a? (.3) <H> eee eee, </H>
Sammy: a squeaky.
Jenny: good, (.)
Sammy: <softly/breathy> a spells a </softly/breathy>
Jenny: uh huh
(.4)
Sammy: <softly/breathy> s q:::[13], (1.8) u:: e: a:, (.9) that spells uh squeaky
</softly/breathy> (.3) #=
Jenny: =yes,
(.4)
Sammy: <softly/breathy> s o, (.8) u n d, </softly/breathy> spells sound.=
Jenny: =good read the beautiful sentence you made. (.7) read it. (1)
Sammy: Mr Brown [is a squeaky sound,]
[taps pencil on table]
Jenny: i:s what? (.) we forgot a word. (.) i:s?
Sammy: {vocalizations for .5 seconds}
Jenny: Mr. Brown is, add the word. (.) Mr. Brown i:s? (1.1)
Sammy: <softly/breathy> a squeaky sound </softly/breathy> (1.1)
Jenny: Mr. Brown i:s making? (.5) or Mr. Brown,
(1)
Sammy: makes a squea[ky]
Jenny: [ok.] (.) put makes in here. put the word [makes in here] (.)
Sammy: [{vocalizations}]
Jenny: [Mr. Brown makes]
Sammy: [{vocalizations}]

RECORDING 4

Sammy: I like the play group, (1.2)
Jenny: w#, (.4) what'd you mean you like it? (4.1) be specific, (.6) be specific,
psihoula[14]
Sammy: I like to go the *pla:y* group,
(1.1)
Jenny: why?
(.9)
Sammy: 'cuz I wanna go see our frie: nds.
Jenny: that's good, (.) who d'you wanna see?
Sammy: Br::ó:::dy
(.3)

[12] /ˈhjuʤə/
[13] /kj::::u:/
[14] Greek term of endearment, literally meaning "little soul."

12 Jenny: yes, (1.8) <quiet> here </quiet> scoot over here.
13 Sammy: {vocalizations for 1.8 seconds}
14 (1.6)
15 Jenny: tell Eleni about Brody.
16 Sammy: Brody is nice.
17 (.)
18 Jenny: yeah, (1.3) what else?
19 (.4)
20 Sammy: happy,
21 (.3)
22 Jenny: yeah,
23 (4.5)
24 Eleni: is he older than you or younger than you?
25 (1.9)
26 Sammy: y::ounger. (1.5) {vocalizations for .5 seconds}
27 Jenny: hmm. (.7) you know {what? (.) if you don't know you can say} I don't know,
28 Sammy" <quiet> {vocalizations for ~1.6 seconds} </quiet>
29 (2.4)
30 Jenny: y'can say I don't know,
31 (.)
32 Sammy: I don't <H> know, </H> (.4)
33 Jenny: he's actually, (1.8) thirteen and a half, (1.2) so he's a little bit,
34 (2)
35 Sammy: {vocalizations .8 seconds}
36 (.7)
37 Jenny: n# he was born in january you were born in june, (1.1) so who's older?
38 (1.4)
39 Sammy: Elen <breathy> i, </breathy> (.4)
40 Eleni: ##{##}
41 Jenny: {yes that's true} you are older {than all of them ##}
42 Sammy: !{vocalizations for 1.6 seconds}!
43 (.5)
44 Jenny: Brody's a little bit older than you.

RECORDING 5

1 Sammy: <mumbled> 'm gonna do i wanna push me ten times, </mumbled>
2 Jenny: say it correctly, (.)
3 Sammy: I want to push me.
4 (1.3)
5 Jenny: in a question,=
6 Sammy: ={vocalizations for 1.4 seconds}
7 Sammy: John will push you ten times,=
8 Jenny =well you gotta ask him.
9 (1.6)

Sammy: John would you push me !*ten*!?
John: yes::.
Jenny: and a- [uh what's]
Sammy: <h> [vocalizations for .8 seconds] </h>
Jenny: the polite way to say that? John, (0.4) would?=
Sammy: =would you (.) <quickly> go outside and push me ten times? </quickly>
Jenny: *please*?
Sammy: please?
John: yes:::, I would ## that sir Sammy.

Appendix 3: Statement Read Before Recordings

"You are about to be recorded as part of an independent research project studying autism and speech. You are free to drop out of this study at any time and for any reason. Just tell me if you would like to stop, and I will stop recording and research immediately. If you have any questions or concerns at any point, feel free to tell me."